GSE Algebra I

EOCT Review
Units 1, 2A, 2B, and 3A

Unit 1: Relationships Among Quantities

Key Ideas

Properties of Rational and Irrational Numbers

Unit Conversions

Writing Expressions and Equations

Arithmetic Operations

Rational and Irrational Numbers

- A rational number is a real number that can be represented as a ratio p/q such that p and q are both integers and q does not equal zero. All rational numbers can be expressed as a decimal that stops or repeats.

- Examples: -0.5, 0, 7, 3/2, 0.2666666…

Rational and Irrational Numbers

- An irrational number is a real number that cannot be expressed as a ratio p/q. Irrational numbers cannot be represented by decimals that stop or repeat.

- Examples: $\sqrt{3}$, π, $\sqrt{5}/2$

Rational and Irrational Numbers

- The sum of an irrational number and a rational number is always irrational.
- The product of a nonzero rational number and an irrational number is always irrational.
- The sum or product of rational numbers is rational.

- Examples: Rational or Irrational?
  - The sum of 0.75 and -2.25?
  - The sum of ½ and $\sqrt{2}$?
  - The product of -0.5 and $\sqrt{3}$?

Simplifying Radicals

1. $3\sqrt{700}$

2. $\sqrt{2}$ $\sqrt{72}$ $\sqrt{5}$

3. $\sqrt{45x^2y^5}$

4. $3\sqrt{8} + \sqrt{32}$

Use Units to Solve Problems

- A quantity is an exact amount or measurement.
- A quantity can be exact or approximate. It is important to consider levels of accuracy. Also the use of an appropriate unit for measurement is important.

- Example: Convert 309 yards to feet.

Use Units to Solve Problems

- Dimensional analysis is a way to determine relationships among quantities using their dimensions, units, or unit equivalences.

- Example: The cost, in dollars, of a single-story home can be approximated using the formula **C=klw**, where **l** is the approximate length of the home and **w** is the approximate width of the home. Find the units for the coefficient **k**.

Use Units to Solve Problems

- Example: Convert 45 miles per hour to feet per minute.
- Example: When Justin goes to work, he drives at an average speed of 65 miles per hour. It takes about 1 hour and 30 minutes for Justin to arrive at work. His car travels about 25 miles per gallon of gas. If gas costs $3.65 per gallon, how much money does Justin spend on gas to travel to work?

Structure of Expressions

- An **algebraic expression** contains variables, numbers, and operation symbols.
- A **term** in an algebraic expression can be a constant, a variable, or a constant multiplied by a variable or variables. Each term is separated by addition, subtraction, or division.
- A **coefficient** is the constant number that is multiplied by a variable in a term.
- The **common factor** is a variable or number that terms can be divided by without a remainder.
- **Factors** are numbers multiplied together to get another number.

Structure of Expressions

Examples:

- Consider the expression $3n^2 + n + 2$.
  - What is the coefficient of n?
  - How many terms are there?

- Look at one of the formulas for the perimeter of a rectangle where l represents length and w represents the weidth. $2(l + w)$
  - What does the 2 represent in this formula?

Arithmetic Operations on Polynomials

- A **polynomial** is an expression made from one or more terms that involve constants, variables, and exponents.
- Examples:

  $3x$

  $x^3 + 5x + 4$

Arithmetic Operations on Polynomials

- To add and subtract polynomials, combine like terms. In a polynomial, like terms have the same variables and are raised to the same powers.
- Examples:

$$7x + 6 + 5x - 3$$

$$13a + 1 - (5a - 4)$$

Arithmetic Operations on Polynomials

- To multiply polynomials, use the Distributive Property. Multiply every term in the first polynomial by every term in the second polynomial. To completely simplify, add like terms after multiplying.
- Example:

$$(x + 5)(x - 3)$$

Unit 2: Reasoning with Linear Equations and Inequalities

Key Ideas

Properties of Equality
Solve Equations and Inequalities
Solve Systems of Equations and Inequalities
Build Functions
Function and Function Notation
Characteristics of Functions
Analyze Functions

Solving Using Properties

Step	Reason
2(3 – a) = 18	Given
6 – 2a = 18	
	Addition POE

Solving Equations

- Example: Karla wants to save up for a prom dress. She figures she can save $9 each week from the money she earns babysitting. If she plans to spend less than $150 for the dress, how many weeks will it take her to save enough money to buy any dress in her price range?

Solving Systems of Linear Equations

- Elimination
  - Ex: Solve this system.

    $3x - 2y = 7$

    $2x - 3y = 3$
- Substitution
  - Ex: Solve this system.

    $2x - y = 1$

    $5 - 3x = 2y$
- Graphing

- Remember:
  - Parallel – No Solution
  - Same Line – Infinite Solutions

Solving Equations and Inequalities Graphically

- Example: Every year Silas buys fudge at the state fair. He buys two types: peanut butter and chocolate. This year he intends to buy $24 worth of fudge. If chocolate costs $4 per pound and peanut butter costs $3 per pound, what are the different combinations of fudge that he can purchase if he only buys whole pounds of fudge?

Solving Equations and Inequalities Graphically

- Example: Graph the inequality

$$x + 2y < 4.$$

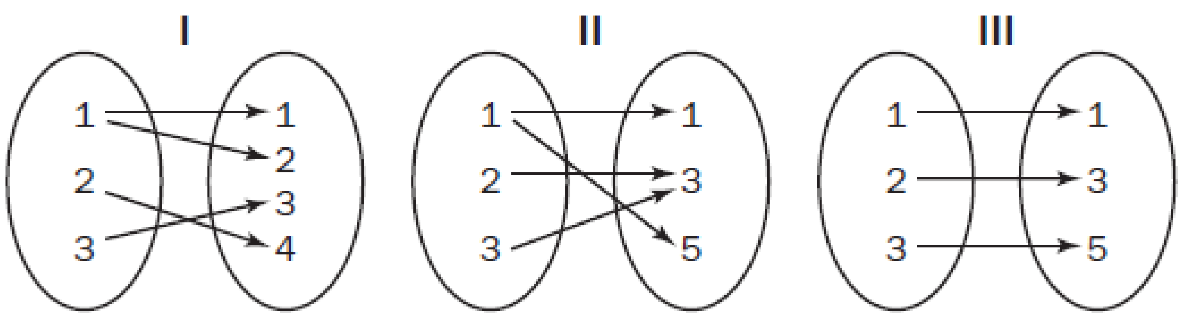
Build Functions

- Ex: Joe started with $13. He has been saving $2 each week to purchase a baseball glove. Write a function that represents the amount of money in Joe's bank account.

- Ex: Rachel eats three cookies on the first day of the month. Each day she eats two more. Write a sequence for how many cookies she eats during the month.

Functions and Function Notation

- Determine if the following are relations or functions:



Set I: {(1, 1), (1, 2), (2, 4), (3, 3)}

Set II: {(1, 1), (1, 5), (2, 3), (3, 3)}

Set III: {(1, 1), (2, 3), (3, 5)}

I

x	y
1	1
1	2
2	4
3	3

II

x	y
1	1
1	5
2	3
3	3

III

x	y
1	1
2	3
3	5

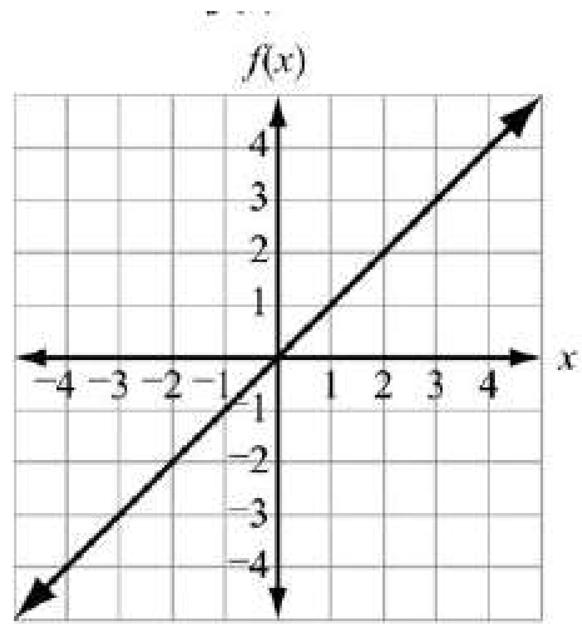
Functions and Function Notation

- Given $f(x) = 2x - 1$, find $f(7)$.

- Consider the sequence 3, 6, 9, 12, 15, … The first term is 3, the second term is 6, the third term is 9, and so on. The "…" at the end of the sequence indicates the pattern continues without end. Can this pattern be considered a function?

Characteristics of Functions

- Domain:
- Range:
- X-intercept:
- Y-intercept:
- Increasing:
- Decreasing:
- Rate of Change:
- End Behavior:



Analyze Functions

- Compare $f(x) = x + 5$, $g(x) = 2x – 5$, and $h(x) = -2x$.

Unit 3: Quadratic Functions

Key Ideas

Factoring

Vertex and Standard Form

Solving by various methods

Building Functions

Transformations

Characteristics

Analyzing Functions

Factoring

- Factor $16a^2 – 81$.

- Factor $12x^2 + 14x – 6$.